RADIO TEST REPORT

Test Report No. : 10636726H-A-R1

Applicant	:	**Panasonic Mobile Communications Development of Europe Ltd**
Type of Equipment	:	**Digital Camera**
Model No.	:	**DMC-CM1**
FCC ID	:	**UCE314062A**
Test regulation	:	**FCC Part 15 Subpart C: 2015 [WLAN / BT LE part]**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
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6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 10636726H-A. 10636726H-A is replaced with this report.

Date of test: January 12 to 20, 2015

Representative test engineer:
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NVLAP LAB CODE: 200572-0

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REVISION HISTORY

Original Test Report No.: 10636726H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10636726H-A	February 20, 2015	-	-
1	10636726H-A-R1	March 5, 2015	P.4	Correction of rating
1	10636726H-A-R1	March 5, 2015	P.7	Correction of FCC 15.31 (e) sentence
1	10636726H-A-R1	March 5, 2015	P.9	Correction of explanatory note for software
1	10636726H-A-R1	March 5, 2015	P.42-45, 51-53	Correction of test report number

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SECTION 1: Customer information

Company Name	:	Panasonic Mobile Communications Development of Europe Ltd
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Telephone Number	:	+44 (0) 1344 706774
Facsimile Number	:	+44 (0) 1344 706796
Contact Person	:	Andrew James

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Camera
Model No.	:	DMC-CM1
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	AC120V/60Hz (AC Adaptor) DC3.8V (Battery)
Receipt Date of Sample	:	January 7, 2015
Country of Mass-production	:	China
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

General Specification

Power Supply (radio part input) : Cellular PA: 3.0V-4.2V (Depend on Battery voltage)
Cellular other RF part: 1.3V, 1.8V, 2.05V, 2.7V (Regulated voltage)
WLAN 5GHz Front-end module: 3.0V-4.2V (Depend on Battery voltage)
WLAN/BT other RF part: 1.3V, 1.8V, 3.0V (Regulated voltage)

Clock frequency(ies) in the system : 2.26GHz (Max)
See below table for other clock frequencies

Frequency	Device
32.768kHz	MSM8974AB
32.768kHz (X'tal)	BUYD2206
27.0MHz	TC358764AXBG, XO2-256-64UCBGA, BUYD2206
48.0MHz (X'tal)	WCN3680
24.0MHz	MSM8974AB, Sub Camera
19.2MHz	WTR1625L, MSM8974AB
19.2MHz (X'tal)	PM8941
9.6MHz	WCD9320
72MHz	Main Camera
27.12MHz	NFC IC

Hardware / Software version : Rev. PR / QRCT Version 3.0.32.0

Radio Specification

	IEEE802.11b	**IEEE802.11g/n (20 M band)**	**IEEE802.11a/n/ac (20 M band)**	**IEEE802.11n/ac (40 M band)**	**IEEE802.11ac (80 M band)**
Frequency of operation	2412-2462MHz *1)	2412-2462MHz *1)	5180-5240MHz 5260-5320MHz 5500-5700MHz 5745-5825MHz	5190-5230MHz 5270-5310MHz 5510-5670MHz 5755-5795MHz	5210MHz 5290MHz 5530-5610MHz 5775MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM)
Channel spacing	5MHz		20MHz	40MHz	80MHz
Antenna type	Monopole				
Antenna Connector type	Spring type				
Antenna Gain	2.4GHz: -5.40dBi W52: -3.0dBi, W53: -3.5dBi, W56: -1.5dBi, W58: -1.8dBi				

*1) 2412-2462MHz is applied for this test report.

	Bluetooth Ver.4.0 with EDR function	**GSM**	**W-CDMA**	**LTE**
Frequency of operation	2402-2480MHz	[Up Link] GSM850: 824 – 849MHz PCS: 1850 – 1910MHz [Down Link] GSM850: 869 – 894MHz PCS: 1930 – 1990MHz	[Up Link] Band II: 1850 – 1910MHz Band IV: 1710 – 1755MHz Band V: 824 – 849MHz [Down Link] Band II: 1930 – 1990MHz Band IV: 2110 – 2155MHz Band V: 869 – 894MHz	[Up Link] Band II: 1850 – 1910MHz Band IV: 1710 – 1755MHz Band V: 824 – 849MHz Band VII: 2500 – 2570MHz Band X VII: 704 – 716MHz [Down Link] Band II: 1930 – 1990MHz Band IV: 2110 – 2155MHz Band V: 869 – 894MHz Band VII: 2620 – 2690MHz Band X VII: 734 – 746MHz
Type of modulation	BT: FHSS (GFSK, π/4-DQPSK, 8-DPSK) LE: GFSK	GMSK , 8PSK	QPSK	QPSK, 16QAM
Channel spacing	BT: 1MHz LE: 2MHz	200kHz	200kHz	100kHz
Antenna type	Monopole	Monopole	Main: Monopole Sub: Monopole	
Antenna Connector type	Spring type	Spring type	Main: Spring type Sub: Spring type	
Antenna Gain	-5.40dBi	GSM850: -0.9dBi PCS: 0.5dBi	Band II: 0.5dBi Band IV: 0.6dBi Band V: -0.9dBi	Band II: 0.5dBi Band IV: 0.6dBi Band V: -0.9dBi Band VII: -0.2dBi Band X VII: -1.5dBi

	NFC	**GPS/GLONASS**
Frequency of operation	13.56MHz	GPS: 1575.42MHz GLONASS: 1597.55-1605.89MHz
Type of modulation	ASK	GPS: BPSK GLONASS: BPSK
Channel spacing	-	GLONASS: 0.5625MHz
Antenna type	Loop	Monopole
Antenna Connector type	Spring type	Spring type
Antenna Gain	N/A	-2.9dBi

*This test report applies for WLAN (IEEE802.11b/11g/11n-20 [2412-2462MHz]) and Bluetooth (Low Energy).

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2015, final revised on January 21, 2015
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

* The revision on January 21, 2015 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.4:2009 7. AC powerline Conducted Emission measurements	**FCC:** Section 15.207	**[WLAN]** **QP** 28.7dB, 0.53847MHz, L **AV** 23.8dB, 0.53928MHz, N 0.53847MHz, L **[BT LE]** **QP** 29.4dB, 0.54331MHz, N **AV** 26.6dB, 0.55449MHz, L	Complied	-
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	**IC:** RSS-210 A8.2(a)			
Maximum Peak Output Power	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	**IC:** RSS-210 A8.4(4)			
Power Density	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section 15.247 (e)		Complied	Conducted
	IC: -	**IC:** RSS-210 A8.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247(issued on June 5, 2014)"	**FCC:** Section15.247(d)	**[WLAN]** 0.5dB 2483.500MHz, PK, Hori. **[BT LE]** 15.9dB 96.001MHz, QP, Hori.	Complied	Conducted/ Radiated
	IC: RSS-Gen 6.13	**IC:** RSS-210 A8.5 RSS-Gen 8.9 RSS-Gen 8.10			
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.					

* In case any questions arise about test procedure, ANSI C63.4: 2009 is also referred.

FCC 15.31 (e)
The EUT is a battery-operated device and test was performed with the full-charged battery.
During the test, the battery was charged from AC Adaptor.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	**IC:** RSS-Gen 6.6	**IC:** -	N/A	-	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.5dB
No.2	3.5dB
No.3	3.6dB
No.4	3.5dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

Antenna terminal conducted emission and Power density (±dB)			**Antenna terminal conducted emission (±dB)**		**Channel power (±dB)**
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Conducted Emission test
[WLAN] The data listed in this test report has enough margin, more than the site margin.
[BT LE] The data listed in this test report has enough margin, more than the site margin.

Radiated emission test(3m)
[WLAN]The data listed in this report meets the limits unless the uncertainty is taken into consideration.
[BT LE] The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

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	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

Test operating mode was determined as follows according to "Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - " of TCB Council Workshop October 2009.

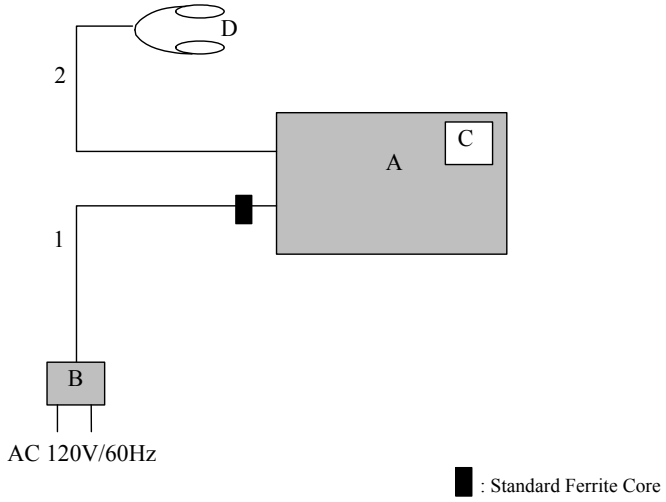
Mode	Remarks*
IEEE 802.11b (11b)	1Mbps, PN9
IEEE 802.11g (11g)	6Mbps, PN9
IEEE 802.11n 20MHz BW (11n-20)	MCS 0, PN9
Bluetooth(BT) LE(Low Energy)	Maximum Packet Size, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*The power value of the EUT was set for testing as follows (setting value might be different from product specification value); Power settings: [WLAN] 11b: 13dBm, 11g: 12dBm, 11n-20: 11dBm [BT LE] 0dBm Software: QRCT Version 3.0.32.0 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission, Conducted Spurious Emission, Radiated Spurious Emission (Below 1GHz)	11g Tx *1)	2412MHz
	BT LE Tx	2402MHz 2440MHz 2480MHz
Radiated Spurious Emission (Above 1GHz)	11b Tx 11g Tx *2)	2412MHz 2437MHz 2462MHz
	BT LE Tx	2402MHz 2440MHz 2480MHz
Radiated Spurious Emission (Band edge)	11n-20 Tx	2412MHz 2462MHz
6dB Bandwidth, Maximum Peak Output Power, Average Output Power, Power Density, 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412MHz 2437MHz 2462MHz
	BT LE Tx	2402MHz 2440MHz 2480MHz

*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.
*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Camera	DMC-CM1	004401221415512	Panasonic	EUT
B	AC Adaptor	VSK0825	k4000106PH	Panasonic	EUT
C	Micro SD Card	02GUECA-MB	-	Panasonic	-
D	Earphone	-	-	Panasonic	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.2	Unshielded	Unshielded	-
2	Earphone Cable	1.2	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane.
The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector **: QP and CISPR AV**
Measurement range **: 0.15-30MHz**
Test data **: APPENDIX**
Test result **: Pass**

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120kHz	RBW: 1MHz VBW: 3MHz	Average Power Method: WLAN: 12.2.5.1 RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Trace: 100 traces Integration Method: WLAN (Band-edge): 13.3.1 Span: 2MHz RBW: 100kHz VBW: 300kHz Detector: Power Averaging (RMS) Trace: 100 traces BT LE: 12.2.5.2 RBW: 1MHz VBW: 3MHz Trace: 100 traces Detector: Power Averaging (RMS) Duty factor was added to the results.	RBW: 100kHz VBW: 300kHz
Test Distance	3m	3m (below 10GHz), 1m *2) (above 10GHz)		3m (below 10GHz), 1m *2) (above 10GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 & 13.3.1 of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)"
*2) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-26.5GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	20MHz/ 3MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak (for BTLE)	Max Hold*1)	Spectrum Analyzer
					Sample (for WLAN)	Clear write	
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3kHz	100kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				

*1) The measurement was performed with Max Hold since the duty cycle was not 100%.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "558074 D01 DTS Meas Guidance v03r02 (Issued on June 5, 2014)".
*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz).

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

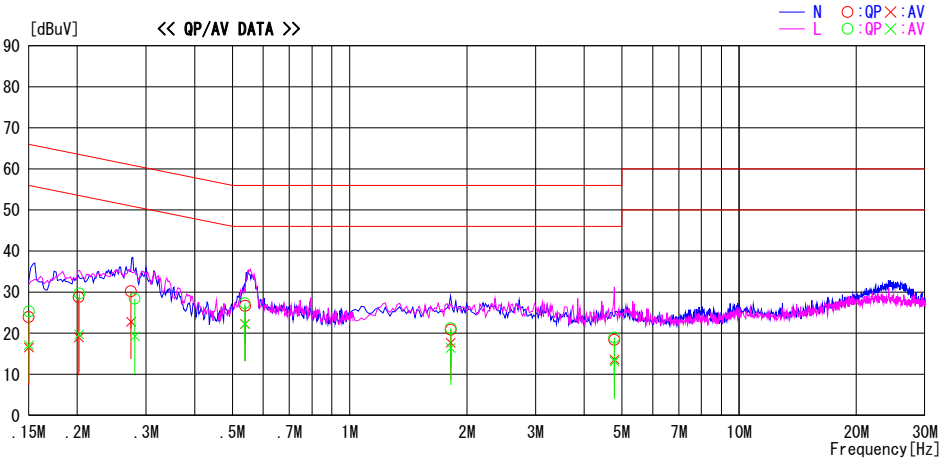
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/01/20

Report No. : 10636726H

Temp./Humi. : 23deg. C / 35% RH
Engineer : Koji Yamamoto

Mode / Remarks : WLAN 11g 2412MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	10.6	3.1	13.4	24.0	16.5	66.0	56.0	42.0	39.5	N	
0.20164	15.3	5.6	13.4	28.7	19.0	63.5	53.5	34.8	34.5	N	
0.27459	16.8	9.4	13.4	30.2	22.8	61.0	51.0	30.8	28.2	N	
0.53928	13.1	8.8	13.5	26.6	22.3	56.0	46.0	29.4	23.8	N	
1.81752	7.1	4.0	13.7	20.8	17.7	56.0	46.0	35.2	28.3	N	
4.78375	4.3	-0.5	14.1	18.4	13.6	56.0	46.0	37.6	32.4	N	
0.15020	11.9	3.7	13.4	25.3	17.1	66.0	56.0	40.7	38.9	L	
0.20241	16.2	6.3	13.4	29.6	19.7	63.5	53.5	33.9	33.8	L	
0.28076	14.9	5.8	13.4	28.3	19.2	60.8	50.8	32.5	31.6	L	
0.53847	13.8	8.8	13.5	27.3	22.3	56.0	46.0	28.7	23.8	L	
1.81840	7.5	2.7	13.7	21.2	16.4	56.0	46.0	34.8	29.6	L	
4.78435	4.8	-1.0	14.1	18.9	13.1	56.0	46.0	37.1	32.9	L	

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

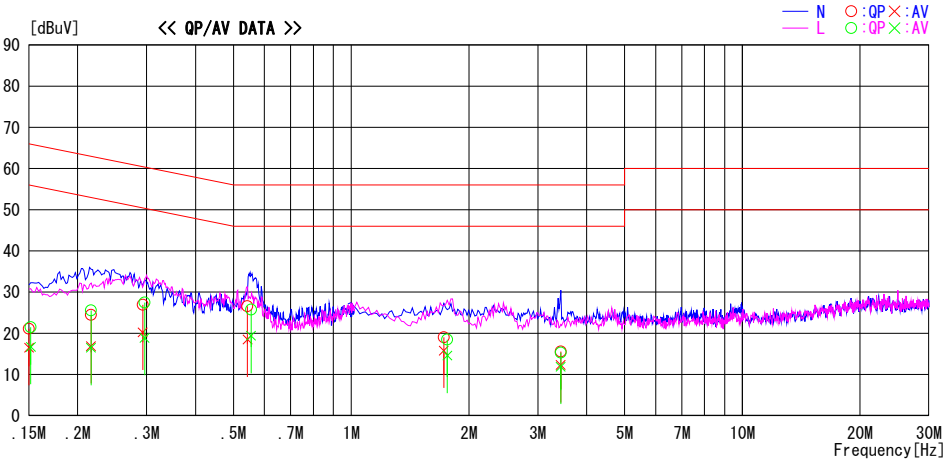
UL Japan, Inc. Ise EMC Lab. No.4 Semi Anechoic Chamber
Date : 2015/01/20

Report No. : 10636726H

Temp./Humi. : 23deg. C / 35% RH
Engineer : Koji Yamamoto

Mode / Remarks : BT LE 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



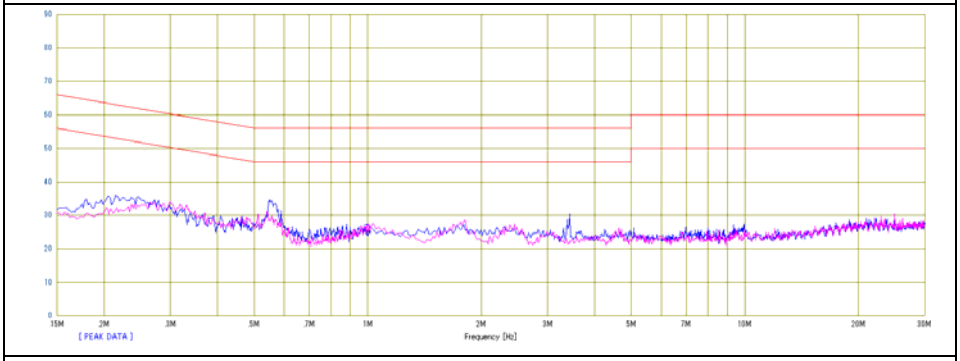
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	7.7	3.1	13.4	21.1	16.5	66.0	56.0	44.9	39.5	N	
0.21625	11.1	3.5	13.4	24.5	16.9	63.0	53.0	38.5	36.1	N	
0.29313	13.5	6.8	13.4	26.9	20.2	60.4	50.4	33.5	30.2	N	
0.54331	13.1	5.0	13.5	26.6	18.5	56.0	46.0	29.4	27.5	N	
1.72523	5.3	2.1	13.7	19.0	15.8	56.0	46.0	37.0	30.2	N	
3.43380	1.8	-1.5	13.8	15.6	12.3	56.0	46.0	40.4	33.7	N	
0.15174	8.1	3.3	13.4	21.5	16.7	65.9	55.9	44.4	39.2	L	
0.21612	12.2	3.1	13.4	25.6	16.5	63.0	53.0	37.4	36.5	L	
0.29645	14.1	5.5	13.4	27.5	18.9	60.3	50.3	32.8	31.4	L	
0.55449	12.2	5.9	13.5	25.7	19.4	56.0	46.0	30.3	26.6	L	
1.76158	4.8	0.9	13.7	18.5	14.6	56.0	46.0	37.5	31.4	L	
3.43380	1.5	-1.9	13.8	15.3	11.9	56.0	46.0	40.7	34.1	L	

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN + CABLE)
Except for the above table : adequate margin data below the limits.

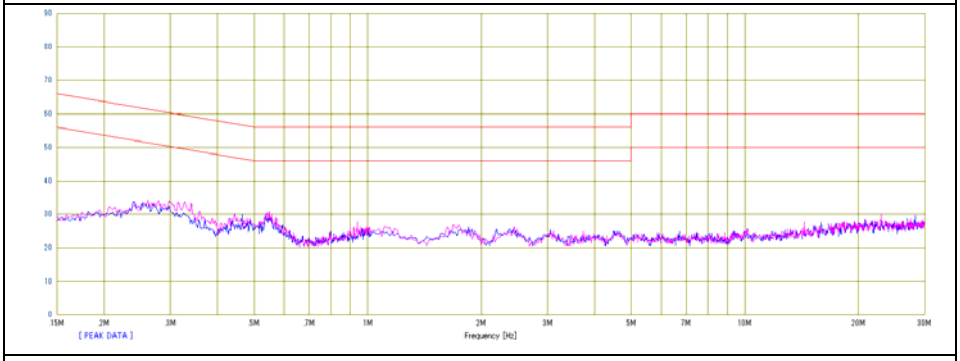
Conducted Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10636726H
Date	01/20/2015
Temperature/ Humidity	23 deg. C / 35% RH
Engineer	Koji Yamamoto
Mode	BT LE Tx

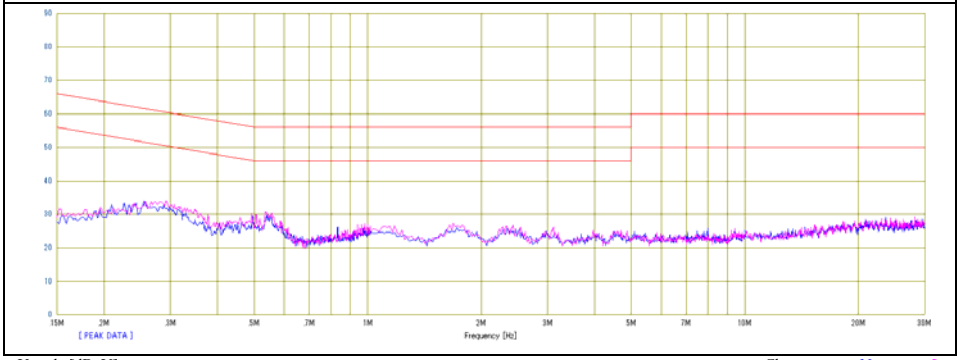
2402MHz



2440MHz



2480MHz



Y scale [dBuV] Chart — N — L

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6dB Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	11b Tx, 11g Tx, 11n-20 Tx

11b

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	8.574	>500
2437	8.564	>500
2462	8.098	>500

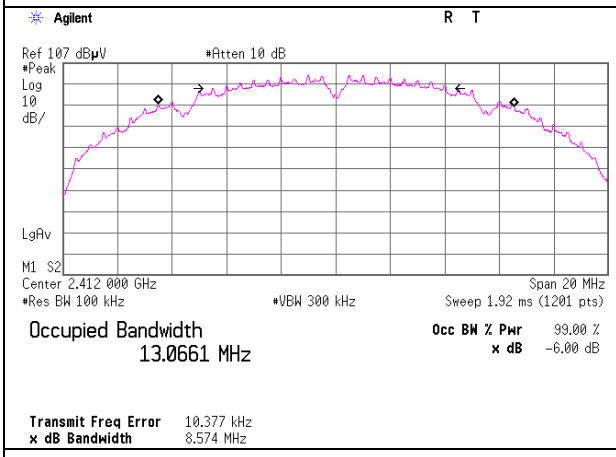
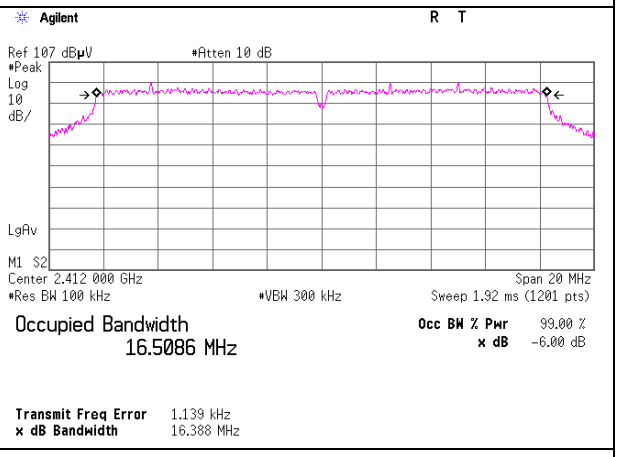
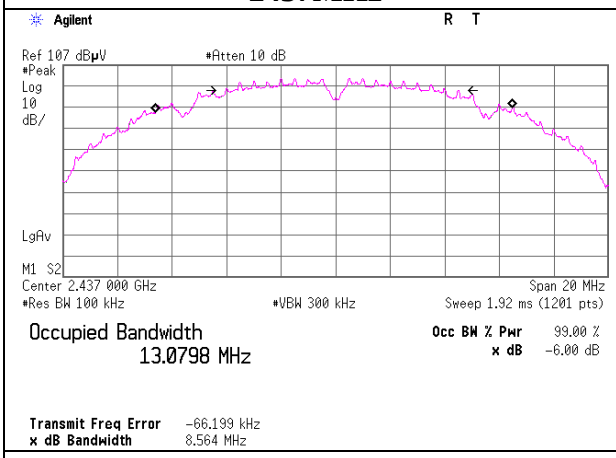
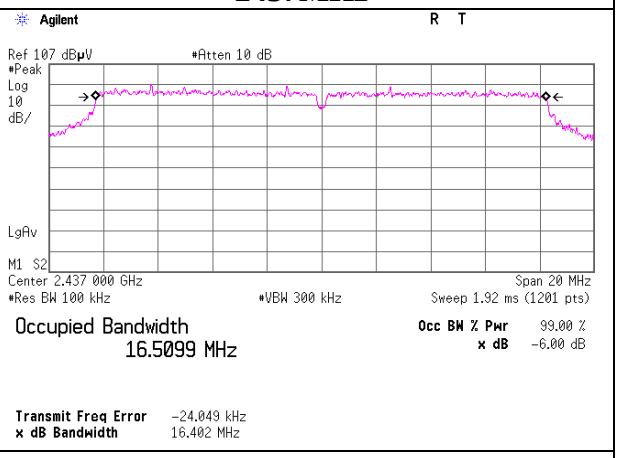
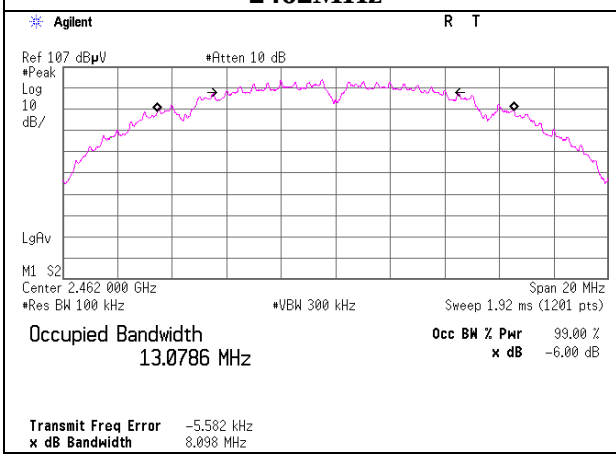
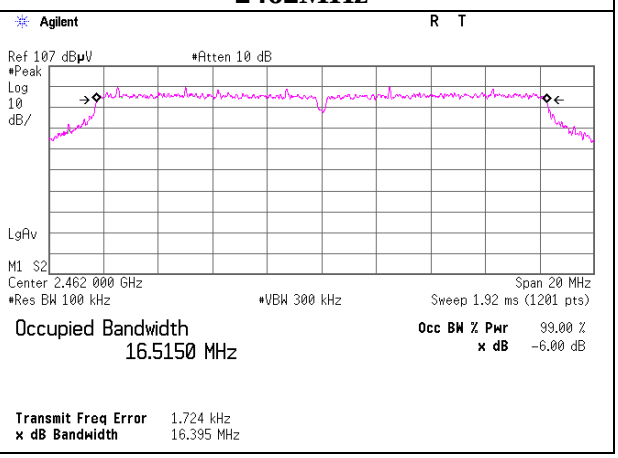
11g

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	16.388	>500
2437	16.402	>500
2462	16.395	>500

11n-20

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2412	17.592	>500
2437	17.630	>500
2462	17.602	>500

6dB Bandwidth

11b	11g
2412MHz	**2412MHz**
	
2437MHz	**2437MHz**
	
2462MHz	**2462MHz**
	

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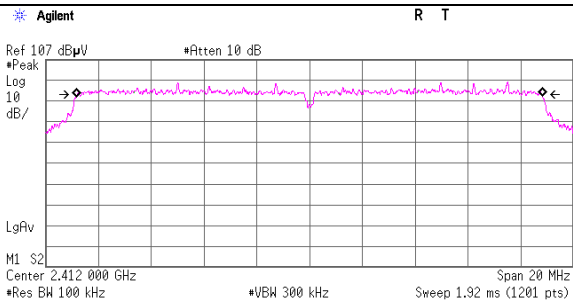
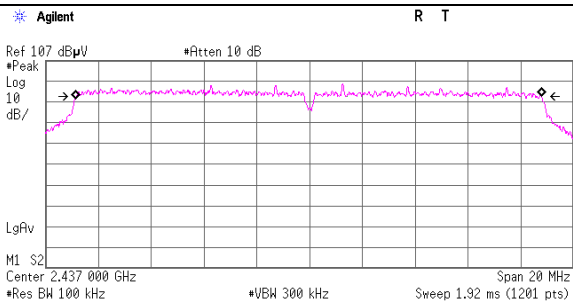
6dB Bandwidth

11n-20

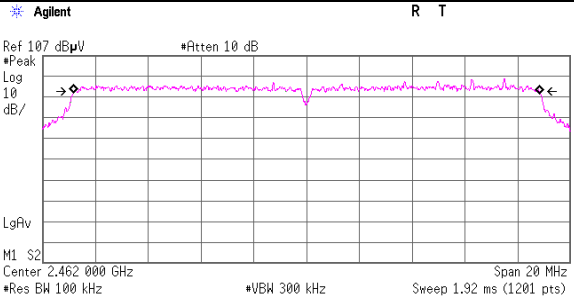
2412MHz



2437MHz



2462MHz



6dB Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

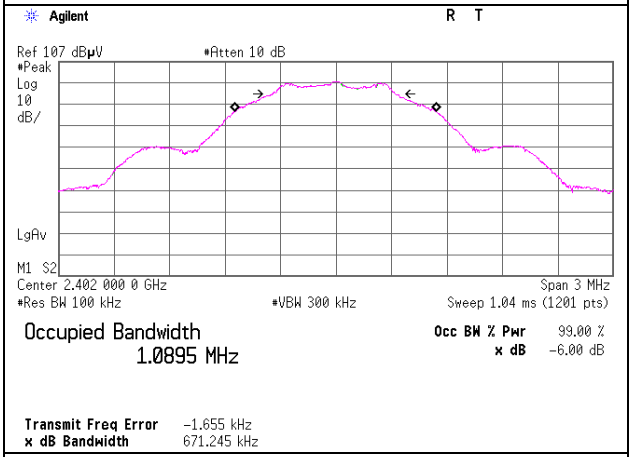
BT LE

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2402	0.671	>500
2440	0.667	>500
2480	0.667	>500

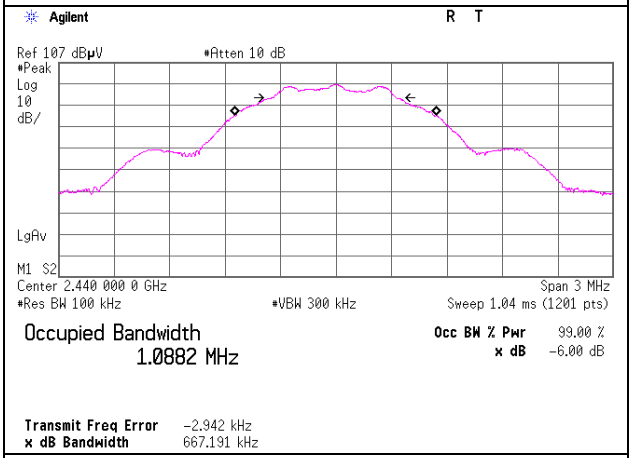
6dB Bandwidth

BT LE

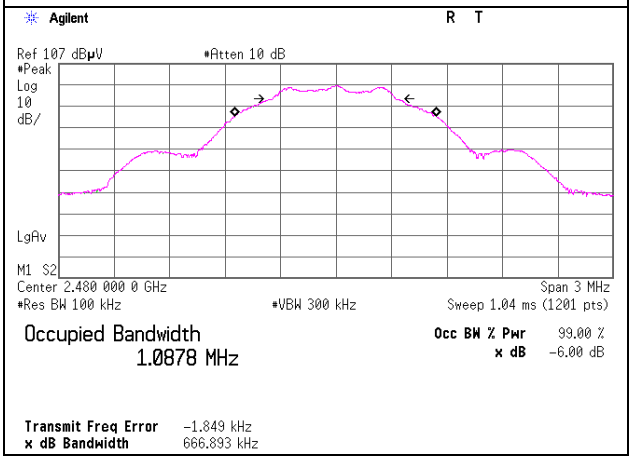
2402MHz



2440MHz



2480MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/13/2015
Temperature/ Humidity	25 deg. C / 32% RH
Engineer	Tomohisa Nakagawa
Mode	11b Tx

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	4.74	0.39	10.04	15.17	32.89	30.00	1000	14.83
2437	4.65	0.39	10.04	15.08	32.21	30.00	1000	14.92
2462	4.60	0.39	10.04	15.03	31.84	30.00	1000	14.97

2412MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	4.74	*
2	4.71	
5.5	4.72	
11	4.70	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/13/2015
Temperature/ Humidity	25 deg. C / 32% RH
Engineer	Tomohisa Nakagawa
Mode	11g Tx

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	10.02	0.39	10.04	20.45	110.92	30.00	1000	9.55
2437	9.73	0.39	10.04	20.16	103.75	30.00	1000	9.84
2462	9.27	0.39	10.04	19.70	93.33	30.00	1000	10.30

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

2412MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	10.02	*
9	9.96	
12	9.95	
18	9.99	
24	9.98	
36	9.97	
48	10.00	
54	9.94	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/13/2015
Temperature/ Humidity	25 deg. C / 32% RH
Engineer	Tomohisa Nakagawa
Mode	11n-20 Tx

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	9.46	0.39	10.04	19.89	97.50	30.00	1000	10.11
2437	9.18	0.39	10.04	19.61	91.41	30.00	1000	10.39
2462	8.79	0.39	10.04	19.22	83.56	30.00	1000	10.78

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

2412MHz

Rate	Reading	Remark
	[dBm]	
MCS0	9.46	*
MCS1	9.45	
MCS2	9.42	
MCS3	9.41	
MCS4	9.43	
MCS5	9.45	
MCS6	9.38	
MCS7	9.42	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-9.21	0.39	10.04	1.22	1.32	30.00	1000	28.78
2440	-10.26	0.39	10.04	0.17	1.04	30.00	1000	29.83
2480	-10.22	0.39	10.04	0.21	1.05	30.00	1000	29.79

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Average Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/13/2015
Temperature/ Humidity	25 deg. C / 32% RH
Engineer	Tomohisa Nakagawa
Mode	11b Tx, 11g Tx, 11n-20 Tx

[AV]

11b **1Mbps**

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	2.05	0.39	10.04	12.48	17.70	30.00	1000	17.52
2437	1.94	0.39	10.04	12.37	17.26	30.00	1000	17.63
2462	1.89	0.39	10.04	12.32	17.06	30.00	1000	17.68

11g **6Mbps**

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	1.04	0.39	10.04	11.47	14.03	30.00	1000	18.53
2437	0.92	0.39	10.04	11.35	13.65	30.00	1000	18.65
2462	0.86	0.39	10.04	11.29	13.46	30.00	1000	18.71

11n-20 **MCS0**

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	-0.11	0.39	10.04	10.32	10.76	30.00	1000	19.68
2437	-0.15	0.39	10.04	10.28	10.67	30.00	1000	19.72
2462	-0.25	0.39	10.04	10.18	10.42	30.00	1000	19.82

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Average Output Power

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-11.52	0.39	10.04	-1.09	0.78	30.00	1000	31.09
2440	-12.60	0.39	10.04	-2.17	0.61	30.00	1000	32.17
2480	-12.56	0.39	10.04	-2.13	0.61	30.00	1000	32.13

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/14/2015	01/15/2015
Temperature/ Humidity	24 deg. C / 32% RH	23 deg. C / 36% RH
Engineer	Takafumi Noguchi (1-10GHz)	Koji Yamamoto (Above 10GHz)
Mode	11b Tx 2412MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	49.3	27.4	3.2	32.8	47.1	73.9	26.8	
Hori	4824.000	PK	46.2	31.6	5.4	31.9	51.3	73.9	22.6	
Hori	7236.000	PK	43.3	36.9	6.5	33.0	53.7	73.9	20.2	Floor Noise
Hori	9648.000	PK	44.0	38.8	7.3	33.4	56.7	73.9	17.2	Floor Noise
Hori	2390.000	AV	38.6	27.4	3.2	32.8	36.4	53.9	17.5	
Hori	4824.000	AV	40.1	31.6	5.4	31.9	45.2	53.9	8.7	
Hori	7236.000	AV	33.8	36.9	6.5	33.0	44.2	53.9	9.7	Floor Noise
Hori	9648.000	AV	34.0	38.8	7.3	33.4	46.7	53.9	7.2	Floor Noise
Vert	2390.000	PK	48.7	27.4	3.2	32.8	46.5	73.9	27.4	
Vert	4824.000	PK	45.9	31.6	5.4	31.9	51.0	73.9	22.9	
Vert	7236.000	PK	42.4	36.9	6.5	33.0	52.8	73.9	21.1	Floor Noise
Vert	9648.000	PK	42.0	38.8	7.3	33.4	54.7	73.9	19.2	Floor Noise
Vert	2390.000	AV	39.2	27.4	3.2	32.8	37.0	53.9	16.9	
Vert	4824.000	AV	40.0	31.6	5.4	31.9	45.1	53.9	8.8	
Vert	7236.000	AV	33.8	36.9	6.5	33.0	44.2	53.9	9.7	Floor Noise
Vert	9648.000	AV	33.5	38.8	7.3	33.4	46.2	53.9	7.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	101.5	27.4	3.2	32.8	99.3	-	-	Carrier
Hori	2400.000	PK	40.8	27.4	3.2	32.8	38.6	79.3	40.7	
Vert	2412.000	PK	101.7	27.4	3.2	32.8	99.5	-	-	Carrier
Vert	2400.000	PK	51.5	27.4	3.2	32.8	49.3	79.5	30.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/14/2015	01/15/2015
Temperature/ Humidity	24 deg. C / 32% RH	23 deg. C / 36% RH
Engineer	Takafumi Noguchi (1-10GHz)	Koji Yamamoto (Above 10GHz)
Mode	11b Tx 2437MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	46.5	31.7	5.5	31.9	51.8	73.9	22.1	
Hori	7311.000	PK	42.6	37.0	6.5	33.0	53.1	73.9	20.8	Floor Noise
Hori	9748.000	PK	42.8	38.9	7.4	33.4	55.7	73.9	18.2	Floor Noise
Hori	4874.000	AV	41.2	31.7	5.5	31.9	46.5	53.9	7.4	
Hori	7311.000	AV	33.8	37.0	6.5	33.0	44.3	53.9	9.6	Floor Noise
Hori	9748.000	AV	33.8	38.9	7.4	33.4	46.7	53.9	7.2	Floor Noise
Vert	4874.000	PK	47.6	31.7	5.5	31.9	52.9	73.9	21.0	
Vert	7311.000	PK	42.2	37.0	6.5	33.0	52.7	73.9	21.2	Floor Noise
Vert	9748.000	PK	42.1	38.9	7.4	33.4	55.0	73.9	18.9	Floor Noise
Vert	4874.000	AV	44.1	31.7	5.5	31.9	49.4	53.9	4.5	
Vert	7311.000	AV	32.0	37.0	6.5	33.0	42.5	53.9	11.4	Floor Noise
Vert	9748.000	AV	34.3	38.9	7.4	33.4	47.2	53.9	6.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/14/2015	01/15/2015
Temperature/ Humidity	24 deg. C / 32% RH	23 deg. C / 36% RH
Engineer	Takafumi Noguchi (1-10GHz)	Koji Yamamoto (Above 10GHz)
Mode	11b Tx 2462MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	50.0	27.6	3.3	32.7	48.2	73.9	25.7	
Hori	4924.000	PK	44.8	31.9	5.5	31.9	50.3	73.9	23.6	
Hori	7386.000	PK	42.1	37.1	6.5	33.1	52.6	73.9	21.3	Floor Noise
Hori	9848.000	PK	42.1	38.9	7.4	33.5	54.9	73.9	19.0	Floor Noise
Hori	2483.500	AV	40.5	27.6	3.3	32.7	38.7	53.9	15.2	
Hori	4924.000	AV	39.4	31.9	5.5	31.9	44.9	53.9	9.0	
Hori	7386.000	AV	33.3	37.1	6.5	33.1	43.8	53.9	10.1	Floor Noise
Hori	9848.000	AV	33.2	38.9	7.4	33.5	46.0	53.9	7.9	Floor Noise
Vert	2483.500	PK	49.4	27.6	3.3	32.7	47.6	73.9	26.3	
Vert	4924.000	PK	48.2	31.9	5.5	31.9	53.7	73.9	20.2	
Vert	7386.000	PK	42.2	37.1	6.5	33.1	52.7	73.9	21.2	Floor Noise
Vert	9848.000	PK	42.1	38.9	7.4	33.5	54.9	73.9	19.0	Floor Noise
Vert	2483.500	AV	39.1	27.6	3.3	32.7	37.3	53.9	16.6	
Vert	4924.000	AV	45.0	31.9	5.5	31.9	50.5	53.9	3.4	
Vert	7386.000	AV	33.4	37.1	6.5	33.1	43.9	53.9	10.0	Floor Noise
Vert	9848.000	AV	34.6	38.9	7.4	33.5	47.4	53.9	6.5	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10636726H		
Date	01/14/2015	01/15/2015	01/15/2015
Temperature/ Humidity	24 deg. C / 32% RH	23 deg. C / 36% RH	23 deg. C / 36% RH
Engineer	Takafumi Noguchi (1-10GHz)	Koji Yamamoto (Above 10GHz)	Koji Yamamoto (Below 1GHz)
Mode	11g Tx 2412MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	31.623	QP	25.5	16.9	7.1	32.1	17.4	40.0	22.6	
Hori	102.768	QP	42.1	10.5	8.1	32.1	28.6	43.5	14.9	
Hori	153.367	QP	27.1	15.1	8.7	32.0	18.9	43.5	24.6	
Hori	402.405	QP	25.6	18.2	10.6	32.0	22.4	46.0	23.6	
Hori	628.258	QP	25.1	20.8	11.9	32.2	25.6	46.0	20.4	
Hori	953.715	QP	26.3	25.8	13.5	30.9	34.7	46.0	11.3	
Hori	2390.000	PK	69.7	27.4	3.2	32.8	67.5	73.9	6.4	
Hori	4824.000	PK	40.3	31.6	5.4	31.9	45.4	73.9	28.5	Floor Noise
Hori	7236.000	PK	41.8	36.9	6.5	33.0	52.2	73.9	21.7	Floor Noise
Hori	9648.000	PK	42.1	38.8	7.3	33.4	54.8	73.9	19.1	Floor Noise
Hori	2390.000	AV	51.5	27.4	3.2	32.8	49.3	53.9	4.6	
Hori	4824.000	AV	31.3	31.6	5.4	31.9	36.4	53.9	17.5	Floor Noise
Hori	7236.000	AV	33.3	36.9	6.5	33.0	43.7	53.9	10.2	Floor Noise
Hori	9648.000	AV	33.4	38.8	7.3	33.4	46.1	53.9	7.8	Floor Noise
Vert	31.623	QP	25.5	16.9	7.1	32.1	17.4	40.0	22.6	
Vert	102.766	QP	37.3	10.5	8.1	32.1	23.8	43.5	19.7	
Vert	153.367	QP	26.6	15.1	8.7	32.0	18.4	43.5	25.1	
Vert	406.613	QP	24.8	18.3	10.6	32.0	21.7	46.0	24.3	
Vert	624.050	QP	24.7	20.7	11.9	32.2	25.1	46.0	20.9	
Vert	950.909	QP	24.6	25.7	13.5	30.9	32.9	46.0	13.1	
Vert	2390.000	PK	70.6	27.4	3.2	32.8	68.4	73.9	5.5	
Vert	4824.000	PK	40.5	31.6	5.4	31.9	45.6	73.9	28.3	Floor Noise
Vert	7236.000	PK	42.6	36.9	6.5	33.0	53.0	73.9	20.9	Floor Noise
Vert	9648.000	PK	42.1	38.8	7.3	33.4	54.8	73.9	19.1	Floor Noise
Vert	2390.000	AV	52.0	27.4	3.2	32.8	49.8	53.9	4.1	
Vert	4824.000	AV	32.5	31.6	5.4	31.9	37.6	53.9	16.3	Floor Noise
Vert	7236.000	AV	33.4	36.9	6.5	33.0	43.8	53.9	10.1	Floor Noise
Vert	9648.000	AV	33.3	38.8	7.3	33.4	46.0	53.9	7.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	96.9	27.4	3.2	32.8	94.7	-	-	Carrier
Hori	2400.000	PK	68.1	27.4	3.2	32.8	65.9	74.7	8.8	
Vert	2412.000	PK	98.3	27.4	3.2	32.8	96.1	-	-	Carrier
Vert	2400.000	PK	68.8	27.4	3.2	32.8	66.6	76.1	9.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/14/2015	01/15/2015
Temperature/ Humidity	24 deg. C / 32% RH	23 deg. C / 36% RH
Engineer	Takafumi Noguchi (1-10GHz)	Koji Yamamoto (Above 10GHz)
Mode	11g Tx 2437MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	47.4	31.7	5.5	31.9	52.7	73.9	21.2	
Hori	7311.000	PK	41.3	37.0	6.5	33.0	51.8	73.9	22.1	Floor Noise
Hori	9748.000	PK	41.7	38.9	7.4	33.4	54.6	73.9	19.3	Floor Noise
Hori	4874.000	AV	38.0	31.7	5.5	31.9	43.3	53.9	10.6	
Hori	7311.000	AV	33.2	37.0	6.5	33.0	43.7	53.9	10.2	Floor Noise
Hori	9748.000	AV	33.3	38.9	7.4	33.4	46.2	53.9	7.7	Floor Noise
Vert	4874.000	PK	41.3	31.7	4.6	31.9	45.7	73.9	28.2	Floor Noise
Vert	7311.000	PK	41.7	37.0	5.7	33.0	51.4	73.9	22.5	Floor Noise
Vert	9748.000	PK	41.7	38.9	6.5	33.4	53.7	73.9	20.2	Floor Noise
Vert	4874.000	AV	33.2	31.7	4.6	31.9	37.6	53.9	16.3	Floor Noise
Vert	7311.000	AV	33.1	37.0	5.7	33.0	42.8	53.9	11.1	Floor Noise
Vert	9748.000	AV	33.3	38.9	6.5	33.4	45.3	53.9	8.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/14/2015	01/15/2015
Temperature/ Humidity	24 deg. C / 32% RH	23 deg. C / 36% RH
Engineer	Takafumi Noguchi (1-10GHz)	Koji Yamamoto (Above 10GHz)
Mode	11g Tx 2462MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	74.9	27.6	3.3	32.7	73.1	73.9	0.8	
Hori	4924.000	PK	44.7	31.9	5.5	31.9	50.2	73.9	23.7	Floor Noise
Hori	7386.000	PK	47.1	37.1	6.5	33.1	57.6	73.9	16.3	Floor Noise
Hori	9848.000	PK	46.3	38.9	7.4	33.5	59.1	73.9	14.8	Floor Noise
Hori	2483.500	AV	54.5	27.6	3.3	32.7	52.7	53.9	1.2	integration method
Hori	4924.000	AV	36.3	31.9	5.5	31.9	41.8	53.9	12.1	Floor Noise
Hori	7386.000	AV	39.3	37.1	6.5	33.1	49.8	53.9	4.1	Floor Noise
Hori	9848.000	AV	37.9	38.9	7.4	33.5	50.7	53.9	3.2	Floor Noise
Vert	2483.500	PK	74.9	27.6	3.3	32.7	73.1	73.9	0.8	
Vert	4924.000	PK	45.8	31.9	5.5	31.9	51.3	73.9	22.6	Floor Noise
Vert	7386.000	PK	47.8	37.1	6.5	33.1	58.3	73.9	15.6	Floor Noise
Vert	9848.000	PK	46.2	38.9	7.4	33.5	59.0	73.9	14.9	Floor Noise
Vert	2483.500	AV	53.9	27.6	3.3	32.7	52.1	53.9	1.8	integration method
Vert	4924.000	AV	37.1	31.9	5.5	31.9	42.6	53.9	11.3	Floor Noise
Vert	7386.000	AV	39.0	37.1	6.5	33.1	49.5	53.9	4.4	Floor Noise
Vert	9848.000	AV	37.9	38.9	7.4	33.5	50.7	53.9	3.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 10636726H
Date 01/14/2015
Temperature/ Humidity 24 deg. C / 32% RH
Engineer Takafumi Noguchi
(1-10GHz)
Mode 11n-20 Tx 2412MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	71.6	27.4	3.2	32.8	69.4	73.9	4.5	
Hori	2390.000	AV	50.7	27.4	3.2	32.8	48.5	53.9	5.4	
Vert	2390.000	PK	71.6	27.4	3.2	32.8	69.4	73.9	4.5	
Vert	2390.000	AV	50.5	27.4	3.2	32.8	48.3	53.9	5.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	96.7	27.4	3.2	32.8	94.5	-	-	Carrier
Hori	2400.000	PK	65.3	27.4	3.2	32.8	63.1	74.5	11.4	
Vert	2412.000	PK	96.8	27.4	3.2	32.8	94.6	-	-	Carrier
Vert	2400.000	PK	66.4	27.4	3.2	32.8	64.2	74.6	10.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	10636726H
Date	01/14/2015
Temperature/ Humidity	24 deg. C / 32% RH
Engineer	Takafumi Noguchi
	(1-10GHz)
Mode	11n-20 Tx 2462MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	75.2	27.6	3.3	32.7	73.4	73.9	0.5	
Hori	2483.500	AV	53.4	27.6	3.3	32.7	51.6	53.9	2.3	integration method
Vert	2483.500	PK	74.9	27.6	3.3	32.7	73.1	73.9	0.8	
Vert	2483.500	AV	54.7	27.6	3.3	32.7	52.9	53.9	1.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/13/2015	01/12/2015
Temperature/ Humidity	24 deg. C / 32% RH	20 deg. C / 40% RH
Engineer	Takafumi Noguchi	Kenshi Shimomura
	Below 1GHz	Above 1GHz
Mode	BT LE Tx 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	67.089	QP	28.7	6.7	7.7	32.1	-	11.0	40.0	29.0	
Hori	70.557	QP	29.4	6.3	7.8	32.1	-	11.4	40.0	28.6	
Hori	96.003	QP	42.2	9.3	8.1	32.1	-	27.5	43.5	16.0	
Hori	137.147	QP	24.1	14.2	8.6	32.0	-	14.9	43.5	28.6	
Hori	172.793	QP	26.2	15.9	8.9	32.0	-	19.0	43.5	24.5	
Hori	203.707	QP	27.2	16.7	9.1	31.9	-	21.1	43.5	22.4	
Hori	2390.000	PK	41.9	27.4	3.2	32.8	-	39.7	73.9	34.2	
Hori	4804.000	PK	40.8	31.5	5.4	31.9	-	45.8	73.9	28.1	Floor Noise
Hori	7206.000	PK	42.3	36.8	6.6	33.0	-	52.7	73.9	21.2	Floor Noise
Hori	9608.000	PK	42.2	38.8	7.3	33.4	-	54.9	73.9	19.0	Floor Noise
Hori	2390.000	AV	33.4	27.4	3.2	32.8	2.0	33.2	53.9	20.7	*1)
Hori	4804.000	AV	31.8	31.5	5.4	31.9	-	36.8	53.9	17.1	Floor Noise
Hori	7206.000	AV	33.2	36.8	6.6	33.0	-	43.6	53.9	10.3	Floor Noise
Hori	9608.000	AV	33.4	38.8	7.3	33.4	-	46.1	53.9	7.8	Floor Noise
Vert	67.247	QP	28.9	6.7	7.7	32.1	-	11.2	40.0	28.8	
Vert	76.803	QP	35.7	6.3	7.8	32.1	-	17.7	40.0	22.3	
Vert	96.000	QP	37.7	9.3	8.1	32.1	-	23.0	43.5	20.5	
Vert	136.577	QP	23.4	14.1	8.5	32.0	-	14.0	43.5	29.5	
Vert	172.802	QP	25.2	15.9	8.9	32.0	-	18.0	43.5	25.5	
Vert	204.916	QP	24.6	16.7	9.1	31.9		18.5	43.5	25.0	
Vert	2390.000	PK	41.6	27.4	3.2	32.8	-	39.4	73.9	34.5	
Vert	4804.000	PK	41.3	31.5	5.4	31.9	-	46.3	73.9	27.6	Floor Noise
Vert	7206.000	PK	42.0	36.8	6.6	33.0	-	52.4	73.9	21.5	Floor Noise
Vert	9608.000	PK	42.5	38.8	7.3	33.4	-	55.2	73.9	18.7	Floor Noise
Vert	2390.000	AV	33.2	27.4	3.2	32.8	2.0	33.0	53.9	20.9	*1)
Vert	4804.000	AV	31.9	31.5	5.4	31.9	-	36.9	53.9	17.0	Floor Noise
Vert	7206.000	AV	33.4	36.8	6.6	33.0	-	43.8	53.9	10.1	Floor Noise
Vert	9608.000	AV	33.9	38.8	7.3	33.4	-	46.6	53.9	7.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*1) Not Out of Band emission (Leakage Power)

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	96.2	27.4	3.2	32.8	94.0	-	-	Carrier
Hori	2400.000	PK	41.9	27.4	3.2	32.8	39.7	74.0	34.3	
Vert	2402.000	PK	97.9	27.4	3.2	32.8	95.7	-	-	Carrier
Vert	2400.000	PK	42.8	27.4	3.2	32.8	40.6	75.7	35.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

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Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/13/2015	01/12/2015
Temperature/ Humidity	24 deg. C / 32% RH	20 deg. C / 40% RH
Engineer	Takafumi Noguchi	Kenshi Shimomura
	Below 1GHz	Above 1GHz
Mode	BT LE Tx 2440MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	51.013	QP	24.5	10.3	7.5	32.1	-	10.2	40.0	29.8	
Hori	58.098	QP	23.5	8.3	7.6	32.1	-	7.3	40.0	32.7	
Hori	76.810	QP	32.6	6.3	7.8	32.1	-	14.6	40.0	25.4	
Hori	96.002	QP	41.8	9.3	8.1	32.1	-	27.1	43.5	16.4	
Hori	139.286	QP	24.7	14.3	8.6	32.0	-	15.6	43.5	27.9	
Hori	153.601	QP	26.9	15.1	8.7	32.0	-	18.7	43.5	24.8	
Hori	4880.000	PK	40.4	31.8	5.5	31.9	-	45.8	73.9	28.1	Floor Noise
Hori	7320.000	PK	42.3	37.0	6.5	33.0	-	52.8	73.9	21.1	Floor Noise
Hori	9760.000	PK	42.0	38.9	7.4	33.4	-	54.9	73.9	19.0	Floor Noise
Hori	4880.000	AV	32.1	31.8	5.5	31.9	-	37.5	53.9	16.4	Floor Noise
Hori	7320.000	AV	33.6	37.0	6.5	33.0	-	44.1	53.9	9.8	Floor Noise
Hori	9760.000	AV	33.9	38.9	7.4	33.4	-	46.8	53.9	7.1	Floor Noise
Vert	49.598	QP	34.0	10.8	7.5	32.1	-	20.2	40.0	19.8	
Vert	57.599	QP	29.1	8.4	7.6	32.1	-	13.0	40.0	27.0	
Vert	76.807	QP	36.1	6.3	7.8	32.1	-	18.1	40.0	21.9	
Vert	96.002	QP	37.2	9.3	8.1	32.1	-	22.5	43.5	21.0	
Vert	138.790	QP	25.4	14.3	8.6	32.0	-	16.3	43.5	27.2	
Vert	153.367	QP	24.3	15.1	8.7	32.0	-	16.1	43.5	27.4	
Vert	4880.000	PK	40.8	31.8	5.5	31.9	-	46.2	73.9	27.7	Floor Noise
Vert	7320.000	PK	41.9	37.0	6.5	33.0	-	52.4	73.9	21.5	Floor Noise
Vert	9760.000	PK	42.4	38.9	7.4	33.4	-	55.3	73.9	18.6	Floor Noise
Vert	4880.000	AV	32.0	31.8	5.5	31.9	-	37.4	53.9	16.5	Floor Noise
Vert	7320.000	AV	33.5	37.0	6.5	33.0	-	44.0	53.9	9.9	Floor Noise
Vert	9760.000	AV	34.2	38.9	7.4	33.4	-	47.1	53.9	6.8	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	10636726H	
Date	01/13/2015	01/12/2015
Temperature/ Humidity	24 deg. C / 32% RH	20 deg. C / 40% RH
Engineer	Takafumi Noguchi	Kenshi Shimomura
	Below 1GHz	Above 1GHz
Mode	BT LE Tx 2480MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	53.780	QP	23.3	9.5	7.5	32.1	-	8.2	40.0	31.8	
Hori	75.453	QP	31.8	6.3	7.8	32.1	-	13.8	40.0	26.2	
Hori	96.001	QP	42.3	9.3	8.1	32.1	-	27.6	43.5	15.9	
Hori	155.593	QP	26.2	15.2	8.7	32.0	-	18.1	43.5	25.4	
Hori	177.203	QP	25.5	16.1	8.9	32.0	-	18.5	43.5	25.0	
Hori	207.502	QP	26.2	16.7	9.2	31.9	-	20.2	43.5	23.3	
Hori	2483.500	PK	46.5	27.6	3.3	32.7	-	44.7	73.9	29.2	
Hori	4960.000	PK	41.6	32.0	5.5	31.9	-	47.2	73.9	26.7	Floor Noise
Hori	7440.000	PK	41.9	37.2	6.5	33.1	-	52.5	73.9	21.4	Floor Noise
Hori	9920.000	PK	41.9	39.0	7.4	33.5	-	54.8	73.9	19.1	Floor Noise
Hori	2483.500	AV	34.5	27.6	3.3	32.7	2.0	34.7	53.9	21.2	*1)
Hori	4960.000	AV	31.7	32.0	5.5	31.9	-	37.3	53.9	16.6	Floor Noise
Hori	7440.000	AV	33.8	37.2	6.5	33.1	-	44.4	53.9	9.5	Floor Noise
Hori	9920.000	AV	33.7	39.0	7.4	33.5	-	46.6	53.9	7.3	Floor Noise
Vert	53.264	QP	29.9	9.7	7.5	32.1	-	15.0	40.0	25.0	
Vert	76.801	QP	37.8	6.3	7.8	32.1	-	19.8	40.0	20.2	
Vert	96.003	QP	39.1	9.3	8.1	32.1	-	24.4	43.5	19.1	
Vert	153.604	QP	28.8	15.1	8.7	32.0	-	20.6	43.5	22.9	
Vert	176.573	QP	24.4	16.0	8.9	32.0	-	17.3	43.5	26.2	
Vert	205.838	QP	24.4	16.7	9.2	31.9	-	18.4	43.5	25.1	
Vert	2483.500	PK	46.2	27.6	3.3	32.7	-	44.4	73.9	29.5	
Vert	4960.000	PK	40.8	32.0	5.5	31.9	-	46.4	73.9	27.5	Floor Noise
Vert	7440.000	PK	42.2	37.2	6.5	33.1	-	52.8	73.9	21.1	Floor Noise
Vert	9920.000	PK	42.5	39.0	7.4	33.5	-	55.4	73.9	18.5	Floor Noise
Vert	2483.500	AV	34.9	27.6	3.3	32.7	2.0	35.1	53.9	20.8	*1)
Vert	4960.000	AV	32.2	32.0	5.5	31.9	-	37.8	53.9	16.1	Floor Noise
Vert	7440.000	AV	33.9	37.2	6.5	33.1	-	44.5	53.9	9.4	Floor Noise
Vert	9920.000	AV	33.8	39.0	7.4	33.5	-	46.7	53.9	7.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*1) Not Out of Band emission (Leakage Power)

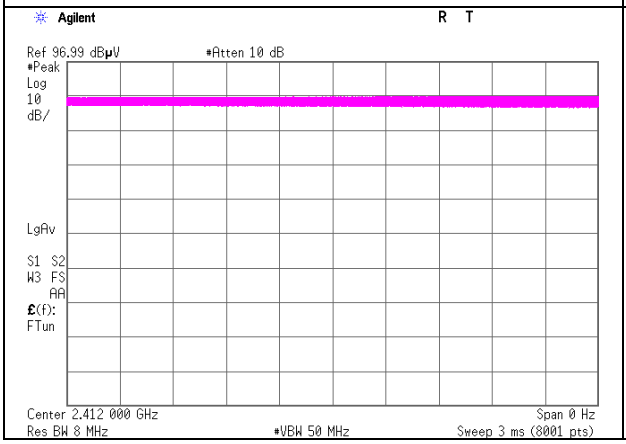
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

Burst rate confirmation

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Koji Yamamoto
Mode	11b Tx, 11g Tx, 11n-20 Tx

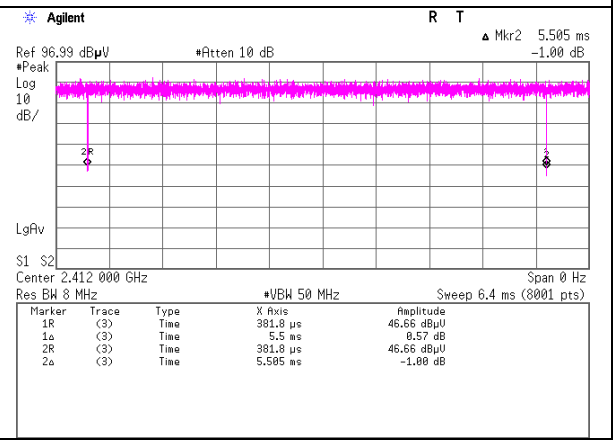
11b 1Mbps

Tx on / (Tx on + Tx off) = 1.000
Tx on / (Tx on + Tx off) * 100 = 100.0 %



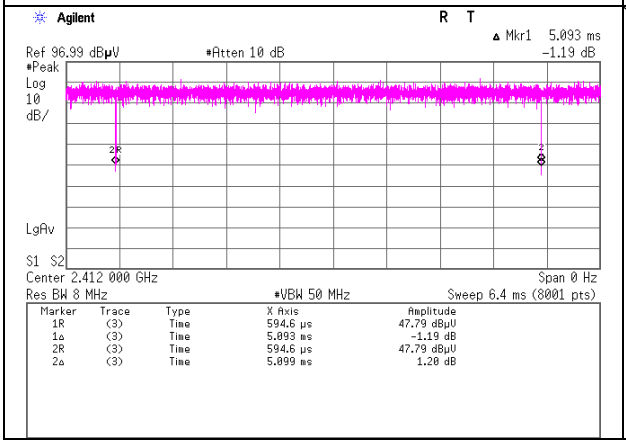
11g 6Mbps

Tx on / (Tx on + Tx off) = 0.999
Tx on / (Tx on + Tx off) * 100 = 99.9 %



11n-20 MCS0

Tx on / (Tx on + Tx off) = 0.999
Tx on / (Tx on + Tx off) * 100 = 99.9



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Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
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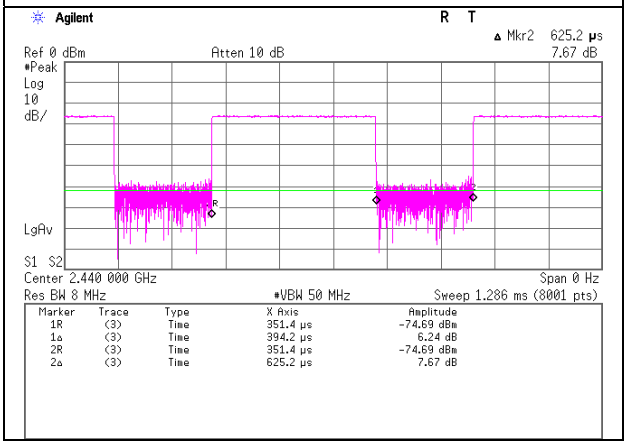
Burst rate confirmation

Test place	Ise EMC Lab. No.4 Measurement Room
Report No.	10636726H
Date	01/12/2015
Temperature/ Humidity	20 deg. C / 40% RH
Engineer	Kenshi Shimomura
Mode	BT LE Tx

BT LE

Tx on / (Tx on + Tx off) = 0.631
Tx on / (Tx on + Tx off) * 100 = 63.1 %
Duty factor = 10 * log (625.2 / 394.2) = 2.00 dB

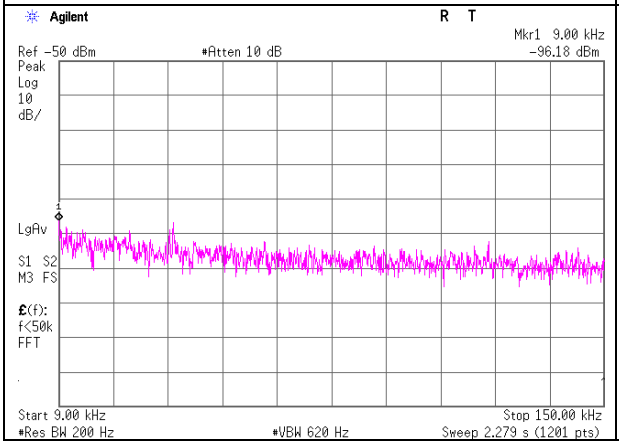


Conducted Spurious Emission

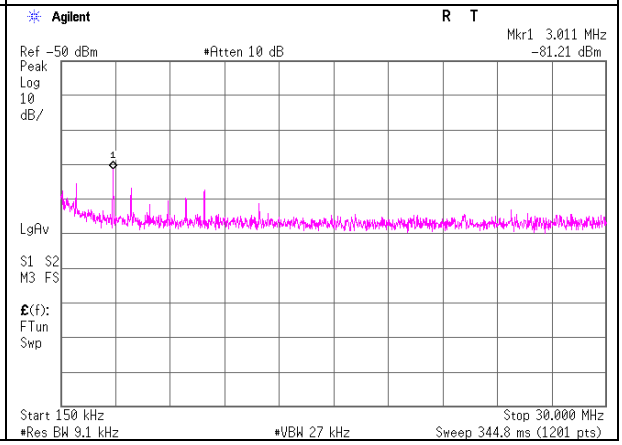
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	11g Tx

11g Tx 2412MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.00	-96.2	0.01	10.0	2.0	1	-84.1	300	6.0	-22.9	48.5	71.4	
3011.00	-81.2	0.01	10.0	2.0	1	-69.2	30	6.0	12.1	29.5	17.4	

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]

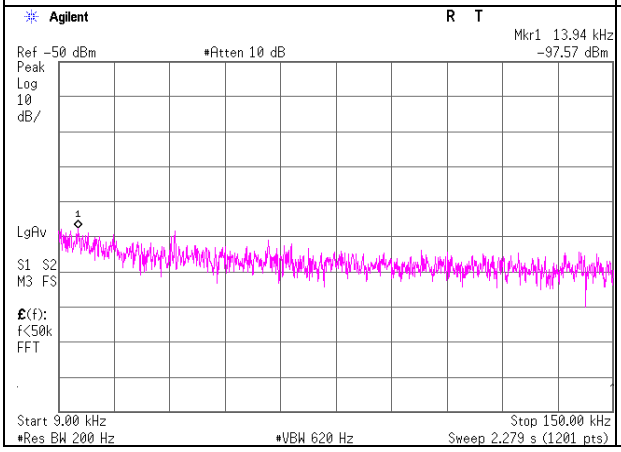
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

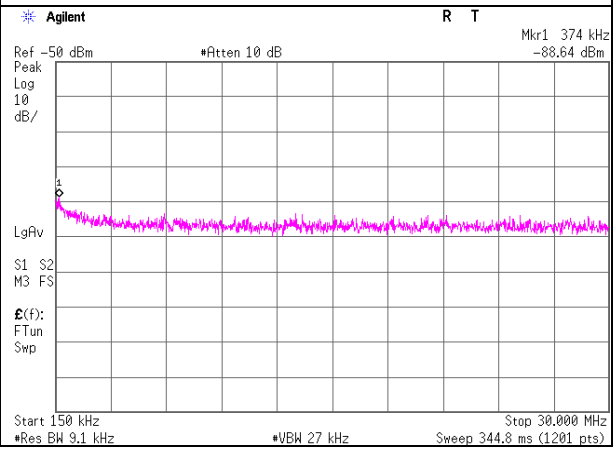
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

BT LE Tx 2402MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
13.94	-97.6	0.01	10.0	2.0	1	-85.5	300	6.0	-24.3	44.7	69.0	
374.00	-88.6	0.01	10.0	2.0	1	-76.6	300	6.0	-15.3	16.1	31.4	

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]

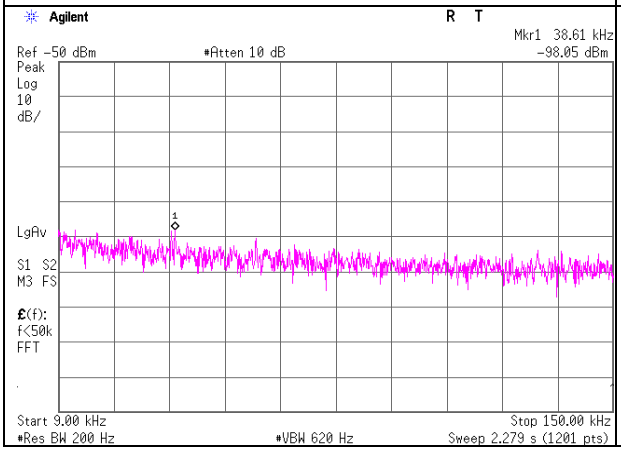
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

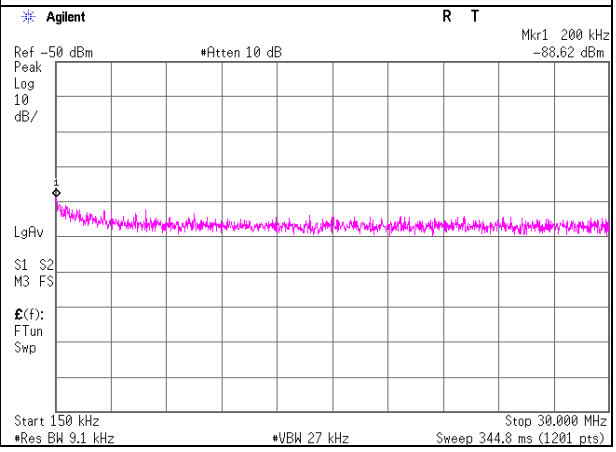
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

BT LE Tx 2440MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
38.61	-98.1	0.01	10.0	2.0	1	-86.0	300	6.0	-24.7	35.8	60.5	
200.00	-88.6	0.01	10.0	2.0	1	-76.6	300	6.0	-15.3	21.5	36.8	

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]

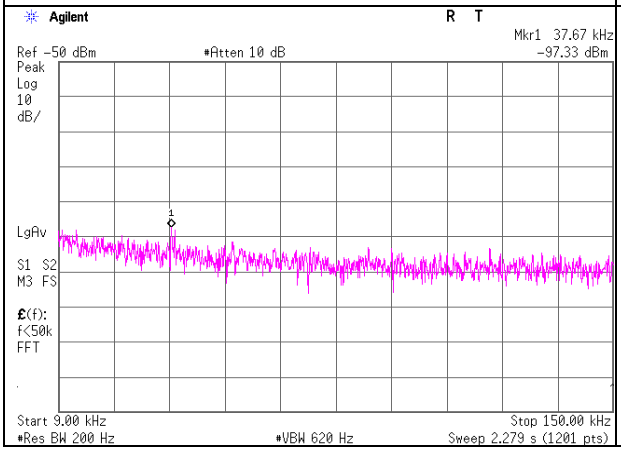
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

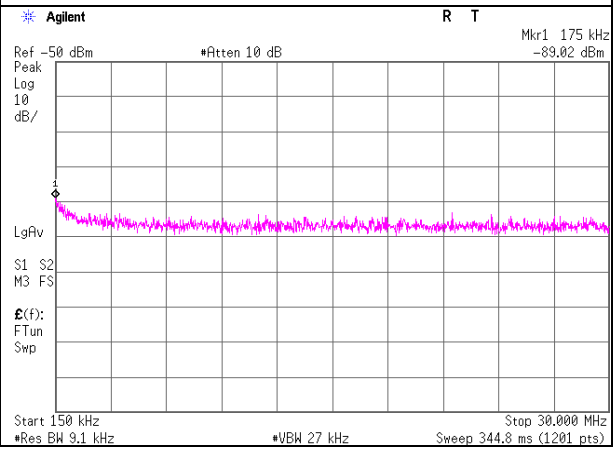
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

BT LE Tx 2480MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
37.67	-97.3	0.01	10.0	2.0	1	-85.3	300	6.0	-24.0	36.0	60.0	
175.00	-89.0	0.01	10.0	2.0	1	-77.0	300	6.0	-15.7	22.7	38.4	

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]

EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	11b Tx, 11g Tx, 11n-20 Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-20.78	0.39	10.04	-10.35	8.00	18.35
2437.00	-19.65	0.39	10.04	-9.22	8.00	17.22
2462.00	-19.87	0.39	10.04	-9.44	8.00	17.44

11g

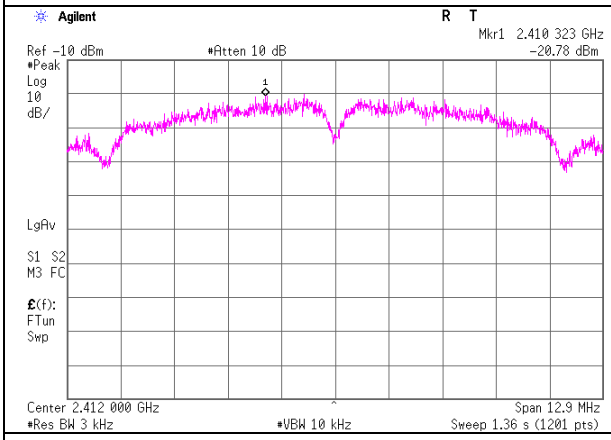
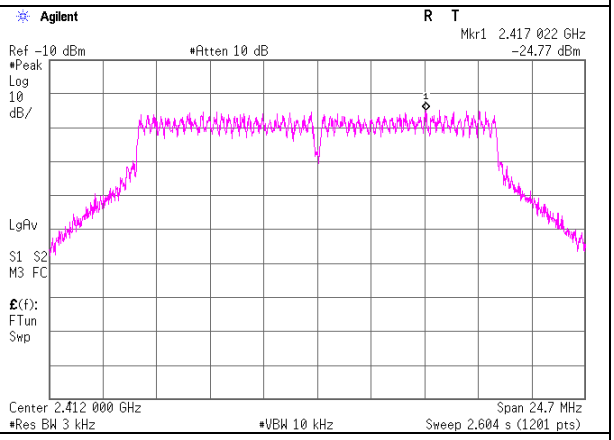
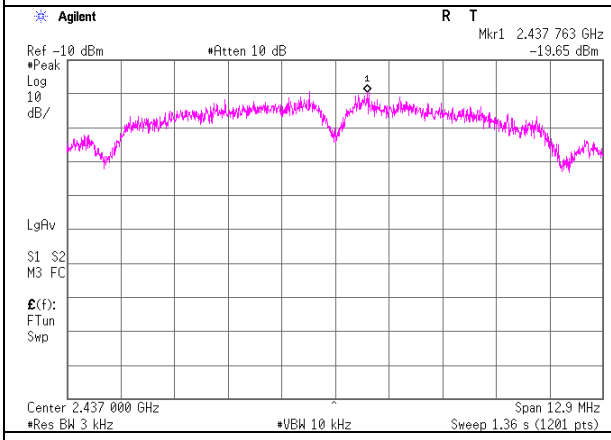
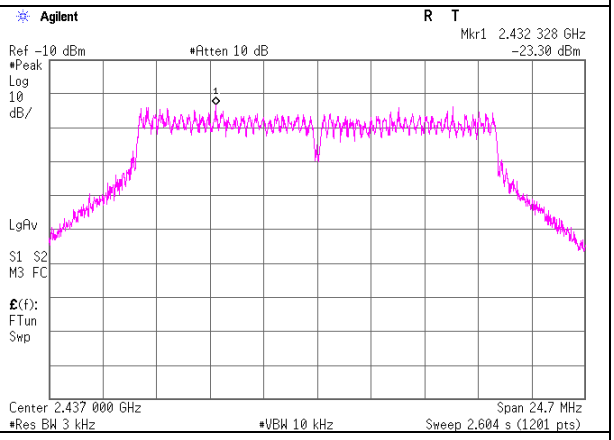
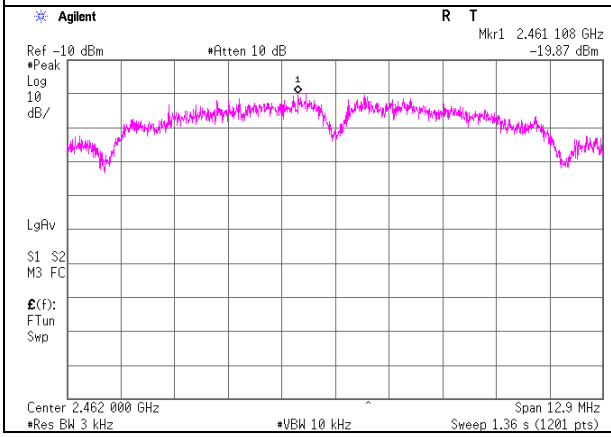
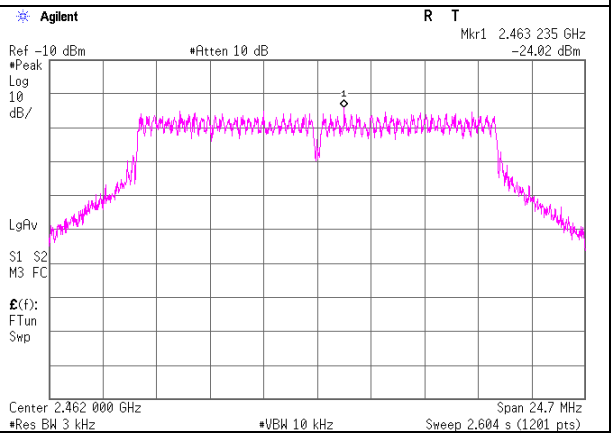
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-24.77	0.39	10.04	-14.34	8.00	22.34
2437.00	-23.30	0.39	10.04	-12.87	8.00	20.87
2462.00	-24.02	0.39	10.04	-13.59	8.00	21.59

11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-25.60	0.39	10.04	-15.17	8.00	23.17
2437.00	-24.81	0.39	10.04	-14.38	8.00	22.38
2462.00	-25.52	0.39	10.04	-15.09	8.00	23.09

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

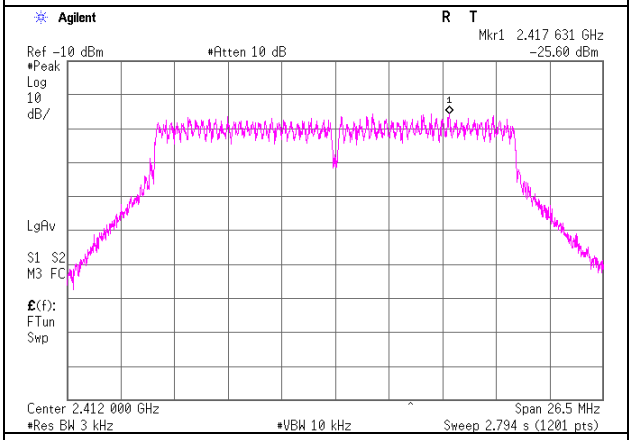
Power Density

11b	11g
2412MHz	**2412MHz**
	
2437MHz	**2437MHz**
	
2462MHz	**2462MHz**
	

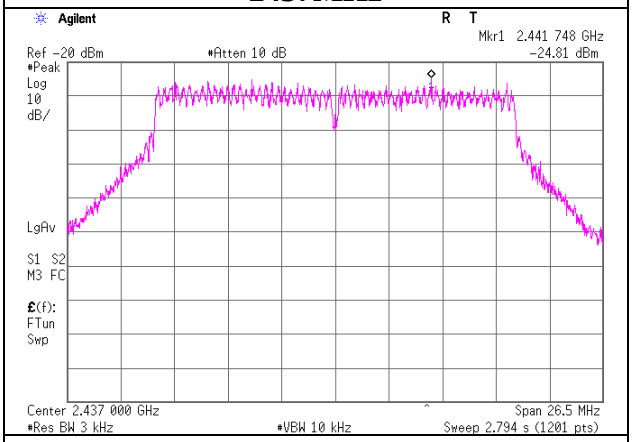
Power Density

11n-20

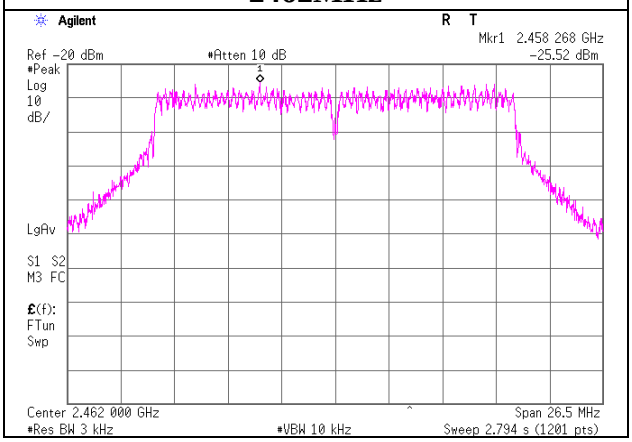
2412MHz



2437MHz



2462MHz



Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

BT LE

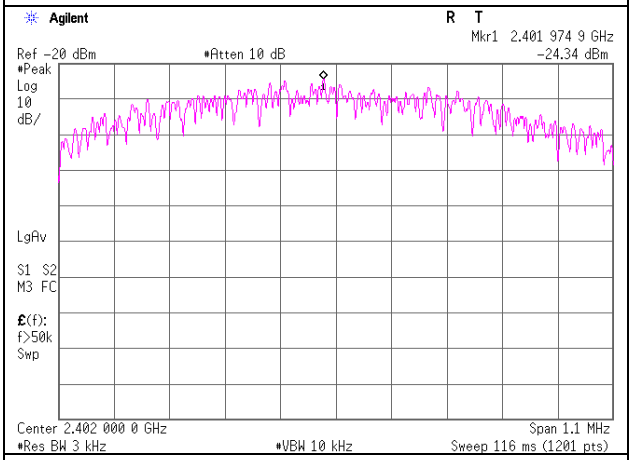
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2402.00	-24.34	0.39	10.04	-13.91	0.04	8.00	21.91
2440.00	-25.40	0.39	10.04	-14.97	0.03	8.00	22.97
2480.00	-25.45	0.39	10.04	-15.02	0.03	8.00	23.02

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

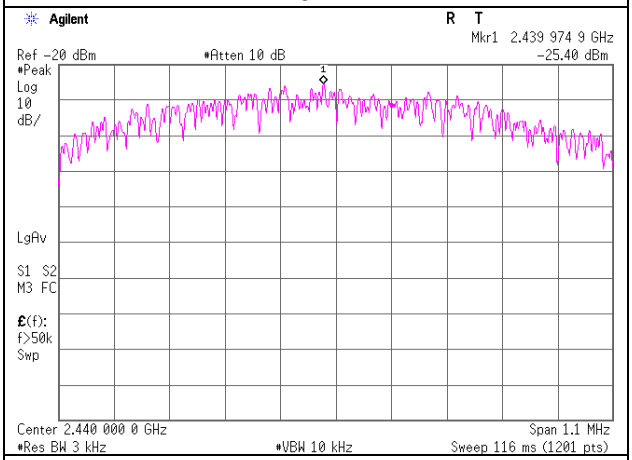
Power Density

BT LE Tx

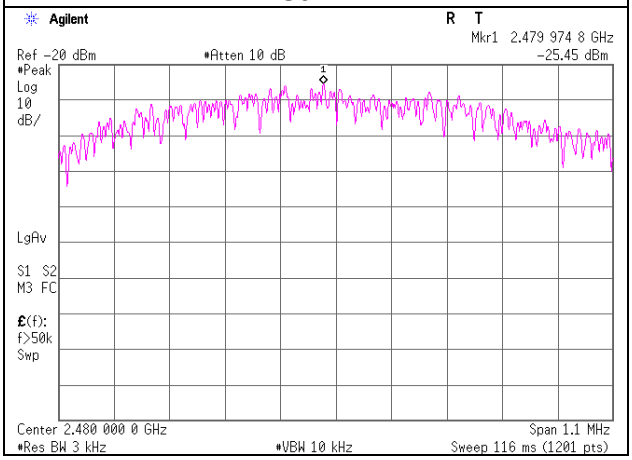
2402MHz



2440MHz

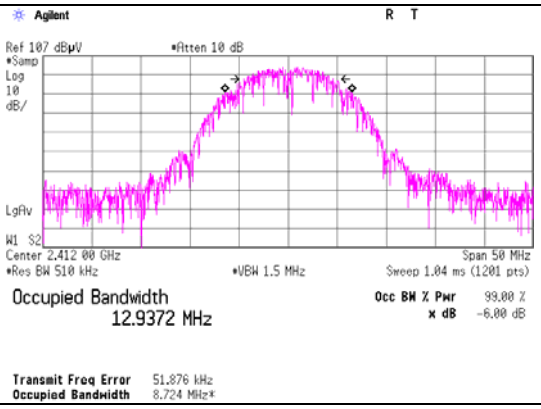
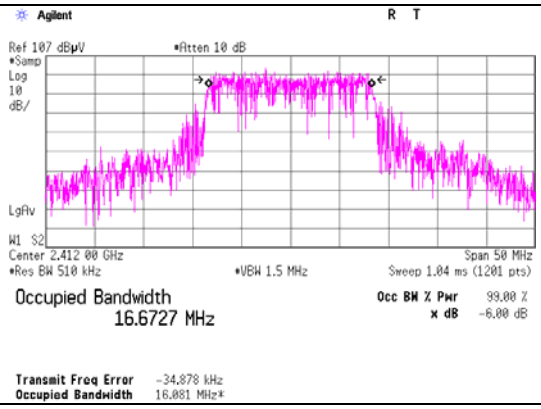
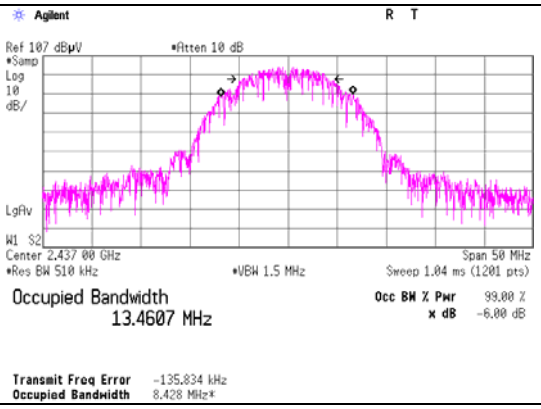
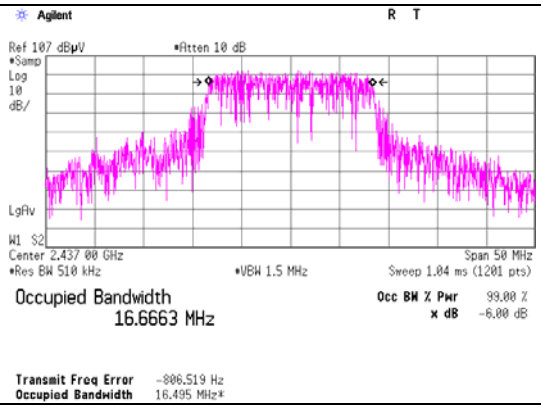


2480MHz



99%Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	11b Tx, 11g Tx

11b	11g
2412MHz	**2412MHz**
	
2437MHz	**2437MHz**
	
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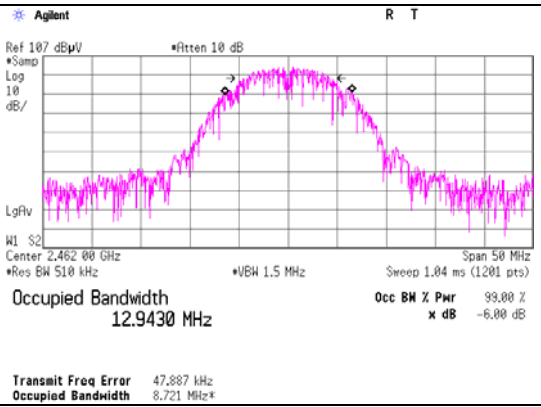	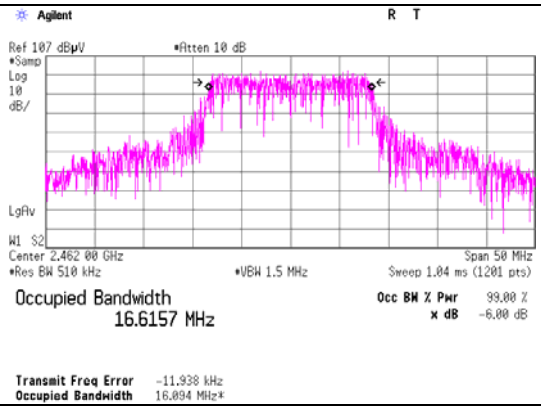

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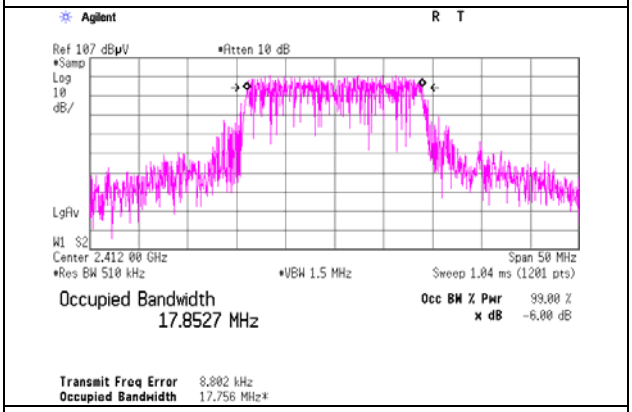
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

99% Occupied Bandwidth

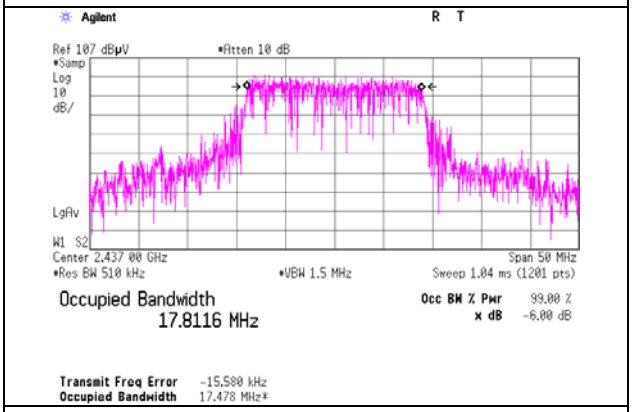
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	11n-20 Tx

11n-20

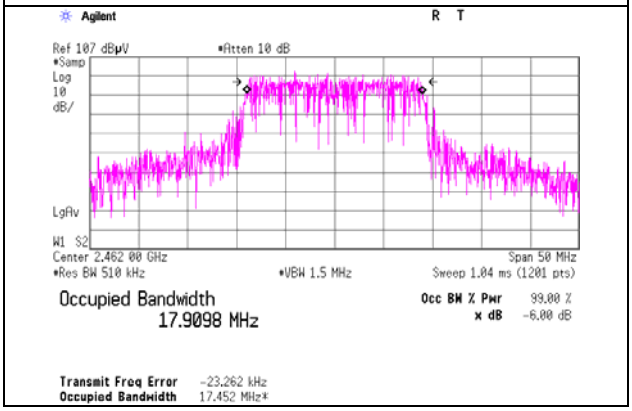
2412MHz



2437MHz



2462MHz

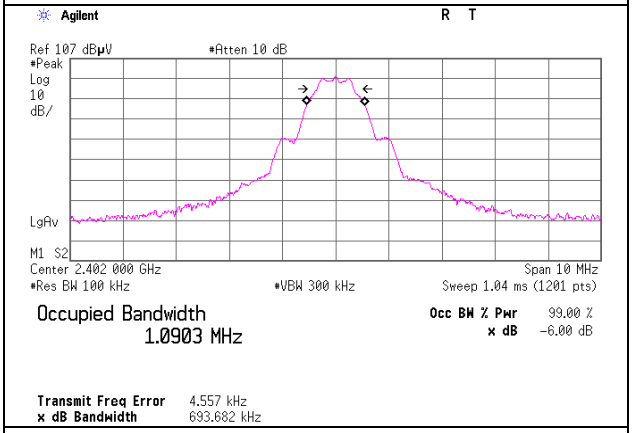


99% Occupied Bandwidth

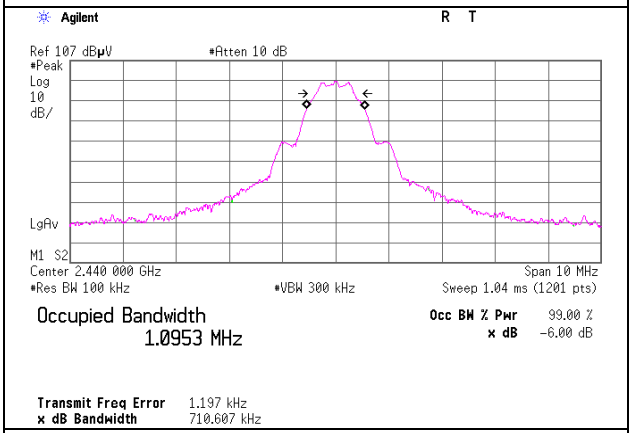
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10636726H
Date	01/15/2015
Temperature/ Humidity	23 deg. C / 38% RH
Engineer	Takumi Shimada
Mode	BT LE Tx

BT LE Tx

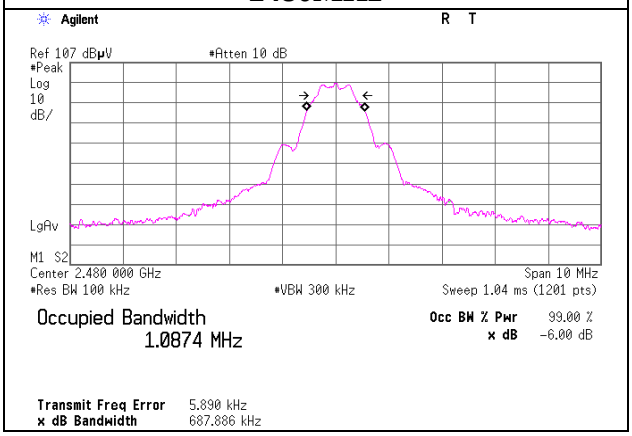
2402MHz



2440MHz



2480MHz



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2014/02/28 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE/CE	2015/01/13 * 12
MJM-23	Measure	ASKUL	-	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2014/06/06 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2014/08/12 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2014/06/11 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2014/03/11 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2014/06/11 * 12
MOS-23	Thermo-Hygrometer	Custom	CTH-201	0004	AT	2014/12/22 * 12
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2014/04/04 * 12
MPSE-23	Power sensor	Agilent	N1923A	MY54070004	AT	2014/04/04 * 12
MCC-96	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	30817/2	AT	2014/05/16 * 12
MAT-58	Attenuator(10dB)	Suhner	6810.19.A	-	AT	2015/01/09 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE/CE	2014/11/10 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2014/11/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2014/11/22 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2014/06/02 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2014/11/11 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2014/03/14 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2014/09/24 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2014/07/10 * 12
MAT-67	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	CE	2014/01/29 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2014/07/15 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test